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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/707,081	11/20/2003	Shih-Chieh Kao	10585-US-PA	1080

31561 7590 09/26/2006

JIANQ CHYUN INTELLECTUAL PROPERTY OFFICE
7 FLOOR-1, NO. 100
ROOSEVELT ROAD, SECTION 2
TAIPEI, 100
TAIWAN

EXAMINER

KORNAKOV, MICHAEL

ART UNIT	PAPER NUMBER
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1746

DATE MAILED: 09/26/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/707,081

Applicant(s)

KAO ET AL.

Examiner

Michael Kornakov

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 July 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 07/25/2006 has been entered.

2. Claims 1-7 are currently pending and examined on the merits.

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. Claims 1, 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al (U.S. 5,989,997) in view of Suzuki et al (U.S. 6,043,145).

Lin teaches a method for forming dual damascene interconnect structure. The method of Lin comprises the steps of providing a substrate having metallic layer (reads on "conductive layer", as instantly claimed) and a dielectric layer formed thereon, wherein the metallic layer is formed over the substrate and the dielectric layer is formed over the metallic layer; patterning the dielectric layer, using **conventional** photolithographic and etching process to form a vertical window 136 (reads on "an opening", as instantly claimed), thus exposing a portion of the metallic layer (col.4, lines 1-30); While using **conventional** photolithographic and etching process to form a vertical window 136, Lin does not explicitly indicate forming a patterned photoresist

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layer on the dielectric layer and removing the patterned photoresist layer. However, it is noted here that such steps of using photoresist for patterning the dielectric layer and forming window are routinely associated with conventional photolithographic and etching process. Thus, Suzuki teaches conventional steps for making an opening while creating multilayer wiring structure applying photolithography technique, which includes patterning photoresist, forming a connecting hole through the insulating film and exposing wiring layer and after this removing the patterned resist layer (col. 4, lines 11-20). Therefore, one skilled in the art motivated by Suzuki would have found obvious to utilize conventional processing steps while patterning dielectric layer and forming the window in the teaching of Lin with the reasonable expectation of success.

After forming a vertical window 136, wherein the conventional steps of patterning photoresist and removing the patterned photoresist are reasonably expected, Lin teaches further processing, which includes removing residual material 138b from the window 136 by treating it with a solution containing sulfuric acid and hydrogen peroxide (reads on "cleaning the opening", as instantly claimed). It is noted here that since the treatment of window 136 with a solution containing sulfuric acid and hydrogen peroxide is followed by depositing copper or copper-aluminum alloy into the window, thus forming a wiring structure, the cleanness of the window 136 is obviously imperative within the teaching of Lin.

5. Claims 2-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al (U.S. 5,989,997) in view of Suzuki et al (U.S. 6,043,145) and in further view of Chen et al (U.S. 2003/0116534).

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The teaching of Lin/Suzuki does not specifically indicate temperature of sulfuric acid/ hydrogen peroxide containing solution, concentrations of sulfuric acid and hydrogen peroxide and a duration of cleaning process. However, such parameters are result effective, since they affect the output and effectiveness of the cleaning process. Therefore, one skilled in the art would have found obvious to optimize the cleaning parameters in order to provide effective removal of residual material from the vertical window in the process of Lin/Suzuki. Besides, processing parameters recited in claims 2-4 are conventionally utilized in the art for cleaning exposed metal layers, which is indicated by Chen and therefore one skilled in the art would have found obvious to utilize such conventional parameters in the teaching of Lin/Suzuki with the reasonable expectation of success.

6. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al (U.S. 5,989,997) in view of Suzuki et al (U.S. 6,043,145) and in further view of Chooi et al (U.S. 6,566,260).

The teaching of Lin/Suzuki does not specifically indicate that metallic layer is a composite layer as per claim 7. However, such composite layers are typically utilized in the art for the fabrication of dual damascene structures. Thus, Chooi teaches that interconnect in dual damascene structure is typically a composite stack comprising one or more of titanium nitride and aluminum-copper (col.7, lines 50-57). Therefore, one skilled in the art would have found obvious to utilize the typical composite stack including titanium nitride and aluminum copper as metal layer in the teaching of Lin/Suzuki with the reasonable expectation of success.

Response to Arguments

7. Applicant's arguments filed 07/25/2006 have been fully considered but they are not persuasive. Applicants argue that one skilled in the art would interpret the solution composed of sulfuric acid, hydrogen peroxide and ammonium hydroxide disclosed by Lin et al. as a photoresist stripper rather than a cleaning solution used in cleaning process. This is not found persuasive, since, for example Chen et al. teach **cleaning** a metal layer with the solution of sulfuric/peroxide, which is identical to the solution recited by applicants and therefore the same cleaning effect is expected within the teaching of Lin. It is axiomatic that one who performs the steps of the known process must necessarily produce all of its advantages. Mere recitation of a newly discovered function or property, that is inherently possessed by things in the prior art **does not cause a claim** drawn to these things to distinguish over the prior art, consult In Re Leinoff v. Louis Milona & Sons, Inc. 220 USPQ 845 (CAFC 1984).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Kornakov whose telephone number is (571) 272-1303. The examiner can normally be reached on 9:00am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr can be reached on (571) 272-1414. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

A handwritten signature in black ink, appearing to read "M. Kornakov", with a long, sweeping horizontal stroke extending to the right.

Michael Kornakov
Primary Examiner
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0-9/21/2006